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Areawide Waste Treatment and Water Quality Management Planning. Erosion Control Priorities and Progress Reporting Jackson County

Greater Egypt Regional Planning and Development Commission, Carbondale, IL

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As one of four demonstration counties in Illinois, Jackson County was analyzed for estimated soil loss in 54 watershed segments using the universal soil loss equation. Soil losses above tolerance were reported for 30 of these watersheds. Watershed segments which gave soil loss estimates more than 11 tons/acre/year were assigned first priority for concentration of soil conservation measures. Estimated soil loss, average tolerance, percentages of land use, slope data, and composite K and C factors are given for each watershed segment. Public meetings for the encouragement of owner cooperation with soil and water conservation districts are reported. A suggested statewide soil conservation progress reporting form is appended.

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Areawide Waste Treatment And Water Quality Management Planning

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Erosion Control Priorities And Progress Reporting: Jackson County

Franklin, Gallatin, Hamilton, Hardin, Jackson, Jefferson, Perry, Pope, Saline, and Williamson Counties, Illinois

GREATER EGYPT REGIONAL PLANNING & DEVELOPMENT COMMISSION

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Erosion Control Priorities And Progress Reporting: Jackson County

Franklin, Gallatin, Hamilton, Hardin, Jackson, Jefferson, Perry, Pope, Saline, and Williamson Counties, Illinois

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GREATER EGYPT REGIONAL PLANNING & DEVELOPMENT COMMISSION

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December, 1980

William Kelley, Chairman
Greater Egypt Regional Planning
and Development Commission

Lloyd Williams, Chairman
Southeastern Illinois Regional Planning
and Development Commission

Transmitted herewith is the Demonstration County Report Erosion Control Priorities and Progress Reporting: Jackson County. This document represents a cooperative effort between the Commission and the Jackson County Soil and Water Conservation District. It addresses potential erosion in watershed segments of the county, prioritization of these segments for erosion control and a system for reporting erosion control progress.

The report is an integral part of the Fiscal Year 1980 Water Quality Management Planning Program. It is designed to meet the contract requirements of Federal Grant P005461-01 with the United States Environmental Protection Agency.

We trust the submittal of this report, as well as others comprising the 1980 Water Quality Management Planning Program, will serve to document the continuing planning activities for water quality management.

Sincerely,

A. S. Kirkikis

A. S. Kirkikis
Executive Director

ASK:jl

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The Kinkaid-Reed's Creek Conservancy District

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Chapter 1

INTRODUCTION

Jackson County, with a population of approximately 58,000 persons, is located along the Mississippi River in the southern tip of Illinois. It is comprised of 387,200 acres of variable terrain ranging from cliffs and eroded headwaters regions to river flood plain lands. Elevation ranges from a high of 330 to a low of 85 feet above sea level. Three topographic regions can be distinguished. These topographic regions are the Mississippi River flood plain which forms the western edge of the county, a band of rugged bluff and hill lands stretching from the northwest corner of the county and expanding to span most of the southern third of the county and a flat upland area in the northeast quarter of the county. The farmlands are highly variable, but are generally characterized by irregular slopes ranging from very low to very high angles of incline.

Drainage patterns in the county feed mainly to the Big Muddy River. Some watersheds drain to the Mississippi River via flood plain drainage ditches. Two major water supply reservoirs have been constructed in the county. These are Kinkaid Lake (west of Murphysboro) and Cedar Lake (south of Carbondale). The Little Muddy River and Beaucoup Creek are the principal tributaries to the Big Muddy River in the county. The Big Muddy River enters the Mississippi at the extreme southwest corner of the county.

Poorly drained bottomlands border the Mississippi River and lower Big Muddy River. Upland claypan soils and terrace soils are characteristic of the northeast quadrant of the county. Rough uplands lie between the relatively flat lands of the northeast and the river bottom lands. These have well developed drainage. The rapid runoff in these areas can lead to severe erosion problems.[1] The large amount of forest acreage in Jackson County adds to its uniqueness when compared to central and northern Illinois counties. The woodland acreage of the county nearly equals the cropland acreage.

Jackson County and three other Illinois counties (McHenry, Monroe, and Livingston Counties) were designated as demonstration counties for the development of procedures by which the progress of soil erosion control efforts could be monitored and reported. The demonstration projects were designed to provide base data concerning erosion in the county, the current status of erosion control treatment efforts and a statement of desired performance standards for the county. A system for evaluating and reporting progress toward the performance standards was to be prepared by each county. A statewide evaluation and reporting method will be evolved from the four county output.

This effort is in keeping with the Environmental Protection Agency (EPA) Program Guidance Memorandum #30 which addresses implementation aspects of Section 208 of the Clean Water Act of 1977 (PL 95-271) which amended the Federal Water Pollution Control Act of 1972 (PL 92-500). This memorandum required that critical areas needing treatment be located and methods of accomplishing treatment of them addressed.

In the case of the Jackson County project, the Soil and Water Conservation District Board has been assisted in meeting the provisions of the "Rules and Regulations Related to the Soil and Water Conservation Districts Act of Illinois,"[2] which require the setting of program standards for erosion control, designation of high priority areas for concentration of erosion control efforts and the reporting of progress.

The establishment of guidelines for the achievement of program standards is required at the county level. These may differ from one county to another among the four demonstration counties, since the counties represent basically quite different areas of the state. The overall goal of the "Soil and Water Conservation Districts Act for Illinois"[3] is to achieve erosion control at tolerance level for all soils and land uses by the year 2000. Interim goals are to achieve tolerance level (T) or less erosion on all lands of 5% slope or less by 1988, with all other lands at or under 2T, and to have no lands eroding at more than 1.5T levels by 1994.

To make evaluation of progress toward these erosion level goals possible, a base line knowledge of current erosion conditions was needed. This required a method for county-wide application of the principles of the universal soil loss equation. Existing inventories of land use (LANDSAT) information and the data gathered by critical erosion site identification efforts in the Cedar Lake watershed supplied initial base data for this project, along with some tried methodology.

The efforts of the Illinois Environmental Protection Agency (IEPA) will be directed towards development of a methodology, a system for progress reporting, standardization of map work and other outputs and development of report forms, all of which can have statewide application. Since the demonstration of progress in each county will determine if erosion control management will remain with Soil and Water Conservation Districts, and will also affect financing of district activities, it is important that a good tool for evaluation and reporting of progress be put in place on a statewide basis.

Chapter 2

PROCEDURES

Maps and Overlays

At the initial project meeting with the Jackson County Soil and Water Conservation District Board it was decided that maps to be used in the project should have a one inch to one mile scale, and be useable against a county highway road map base. The county highway map base was chosen to facilitate identification of specific properties and the planning of field checks.

Overlay maps were made on frosted acetate to the same scale. The overlays depicted soil associations, land use, topography, watersheds and watershed subunits and lands owned by cooperators. The cooperators map overlay also outlined public lands making up Shawnee National Forest, Kinkaid-Reeds Creek Conservancy District, the Crab Orchard National Wildlife Refuge, Giant City State Park, and Lake Murphysboro State Park.

The soil associations were mapped as printed in the Jackson County Soil Survey (Figure 1). Land use areas were mapped from windshield survey and LANDSAT information in ten categories. The categories used were Residential/Urban, Industrial, Commercial/Public, Agricultural, Wooded Lands, Water Areas, and several mining categories (Figure 2). Topographic contour lines were drawn to the one inch to one mile scale from a county composite of 15 minute maps.

Topographic maps prepared by the United States Geological Survey (USGS) watersheds were drawn on the 15 minute topographic composite map, then redrawn to the base map scale on the watershed overlay (Figure 3). The larger watersheds and the Big Muddy River main stem were divided into linear segments. The Mississippi River bottoms was segmented according to physical features into upland and bottomland segments for various Mississippi tributaries where they could be clearly delineated. The overlay map showing cooperators lands and public lands was drawn from

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maps and information supplied by the Jackson County Soil and Water Conservation District and the U.S. Forest Service. The Shawnee National Forest boundaries and the map of cooperators lands were made current as of May, 1980.

The overlay maps showing land use (Figure 2) and watershed segments (Figure 3) were superimposed and overlain with a 10 acre scale grid. Percentage and approximate acreage of each land use category were calculated from counts of the grid squares and fractions of grid squares occupying each land use area. The percentage of agricultural lands used for row crop production was estimated for each topographic region of the county from a LANDSAT land cover map prepared in March, 1978.

To help identify critical erosion areas, detailed soil survey maps prepared for the Soil Survey of Jackson County by the Soil Conservation Service, United States Department of Agriculture (USDA), were reduced in size, assembled in a mosaic map of the county and color coded to show all D-3 and E-3 soil areas. These areas are described as severely eroded with slopes ranging 12 to 18 percent (D-3) and 18 to 30 percent (E-3). Areas designated C-3 on the soil survey maps were described as severely eroded areas with slopes ranging from 6 to 12 percent. Field checks were made of C-3, D-3 and E-3 areas in three townships. The field checks were conducted by driving a planned route through a portion of the township having readily accessible C-3, D-3 and E-3 areas. This was done in April and May when crops were either not yet planted or not yet grown enough to cover the soil. A field check form was prepared (Figure 4). The form was completed while the field check team viewed each site from the access road or property edge.

The color coded D-3 and E-3 soil types map was used to note watersheds with concentrations of severely eroded areas. This information was to be used as a double check on universal soil loss equation findings for the watershed units of the county.

Estimated Soil Loss

Soil loss was estimated for the individual watershed segments using the Universal Soil Loss Equation (Appendix A). The necessary factors for the Universal Soil Loss Equation (USLE) were discussed during meetings with the Jackson County District Conservationist and members of the Soil and Water Conservation District Board. The factors chosen and their source or derivation were as follows:

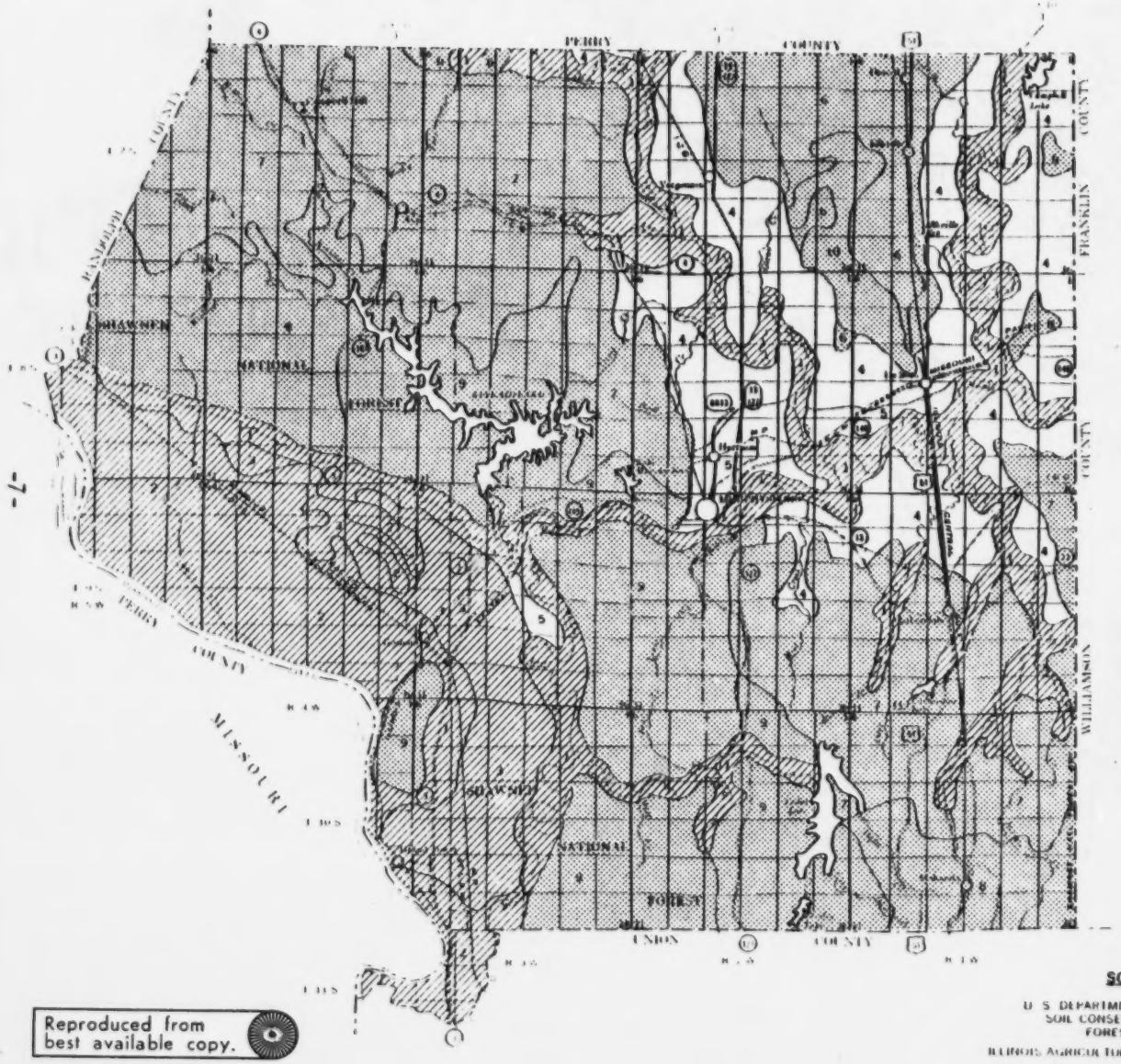

FIGURE 1

JACKSON COUNTY

Soil Associations

LEGEND

DOMINANTLY NEARLY LEVEL TO GENTLY SLOPING SOILS THAT FORMED IN ALLUVIUM ON FLOOD PLAINS

- Bethalto Wakeland association. Somewhat poorly drained soils that formed in water laid silty sediment on tributary flood plains
- Darwin Medway Cairo association. Very poorly drained to somewhat poorly drained soils that formed in water laid clayey or loamy sediment on the flood plain of the Mississippi River
- Jacob Booker association. Very poorly drained and poorly drained soils that formed in water laid, acid clayey sediment on the flood plain of the Mississippi River

DOMINANTLY NEARLY LEVEL TO MODERATELY STEEP SOILS THAT FORMED IN WATER LAID SEDIMENT ON TERRACES

- 4 Hurst Colp St. Charles association. Somewhat poorly drained to well drained soils that formed in silty over clayey sediment or on silty sediment on terraces
- 5 Alvin Camden association. Well drained and moderately well drained soils that formed on sandy and silty sediment over loamy sediment on terraces

DOMINANTLY NEARLY LEVEL TO VERY STEEP SOILS THAT FORMED IN LOESS, GLACIAL DRIFT AND MATERIAL THAT WEATHERED FROM BEDROCK ON UPLANDS

- 6 Bluford Ava Wynoose association. Moderately well drained to poorly drained soils that formed in loess or loess and in some material on uplands
- 7 Hosmer association. Moderately well drained soils that formed on loess on uplands
- 8 Hosmer Wellston association. Moderately well drained and well drained soils that formed on loess or loess and material that weathered from bed rock on uplands
- 9 Alford Wellston association. Well drained soils that formed on loess or loess and material that weathered from bedrock on uplands
- 10 Orthents association. Well drained soils that formed on loamy material on strip mine spoil banks

Compiled 1976

N

scale in miles

1 0 1 2 3 4

SOURCE:

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
ILLINOIS AGRICULTURAL EXPERIMENT STATION

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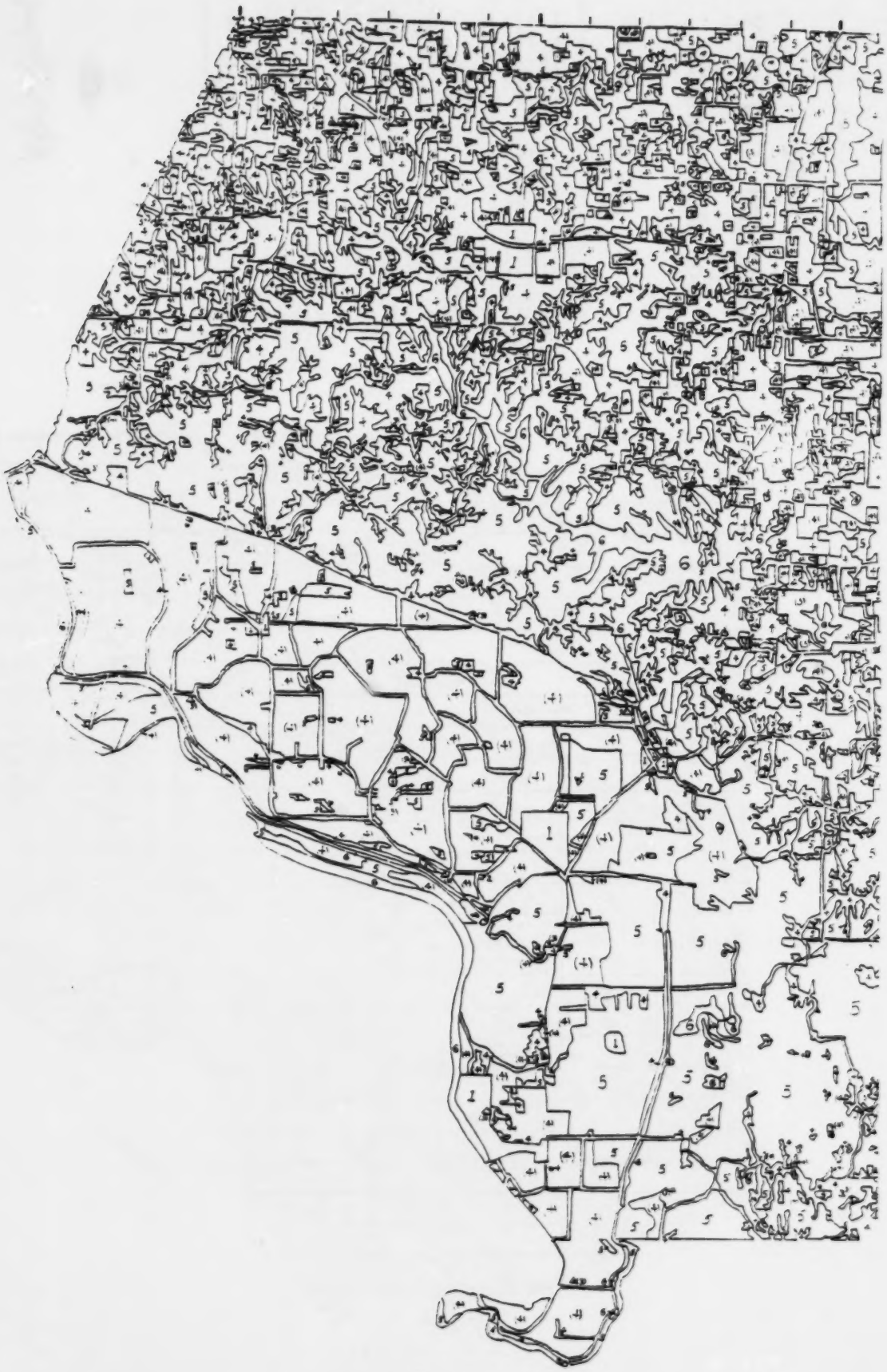

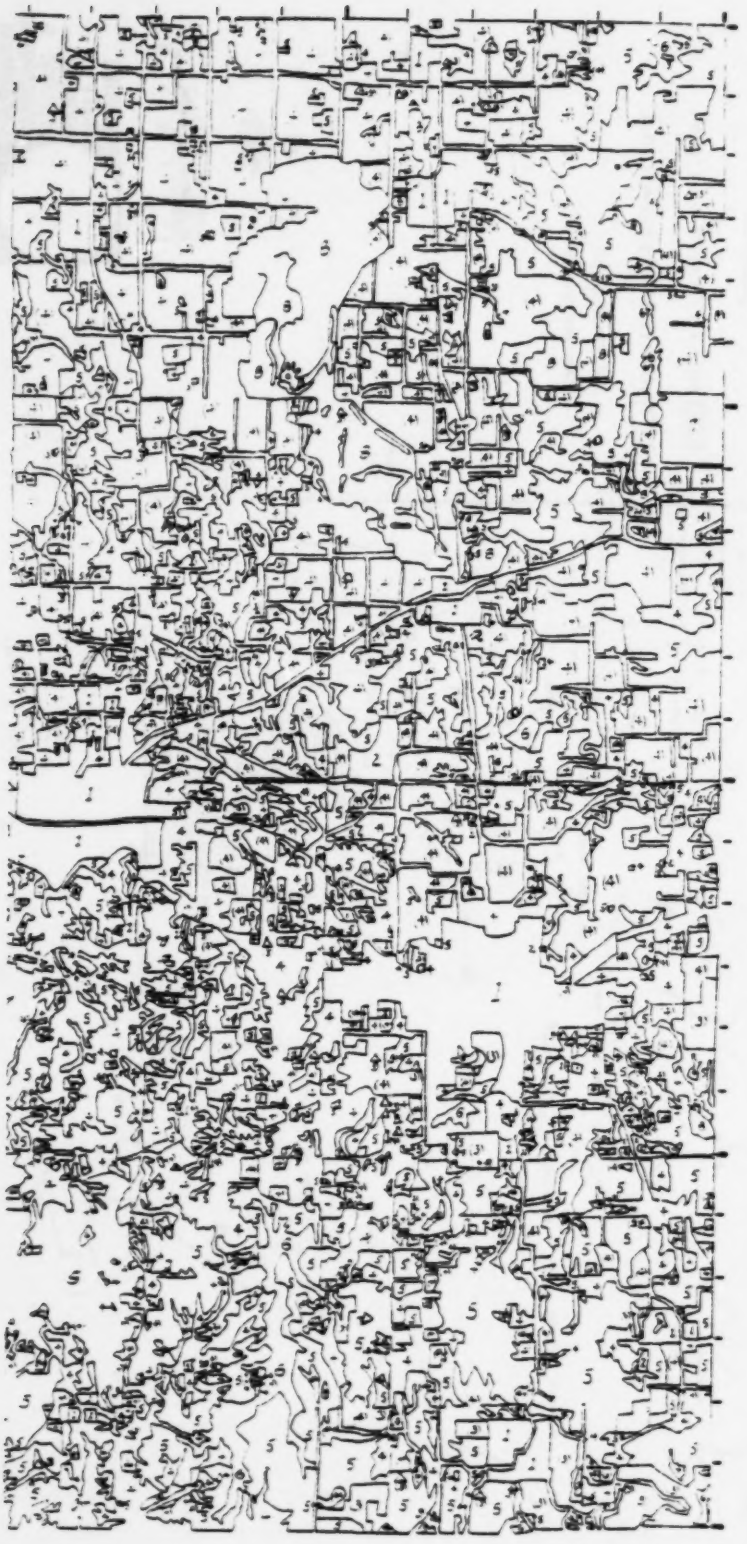

FIGURE 2

JACKSON COUNTY

Land Use Areas

LEGEND

1 - RESIDENTIAL, URBAN
2 - INDUSTRIAL
3 - COMMERCIAL, TRADE, PUBLIC, SEMI-PUBLIC
4 - AGRICULTURE
5 - WOODED
6 - WATER
7-10 - MINING CATEGORIES
- - SECTION DIVISION
— - TOWNSHIP DIVISION

N

scale in miles

1 0 1 2 3 4

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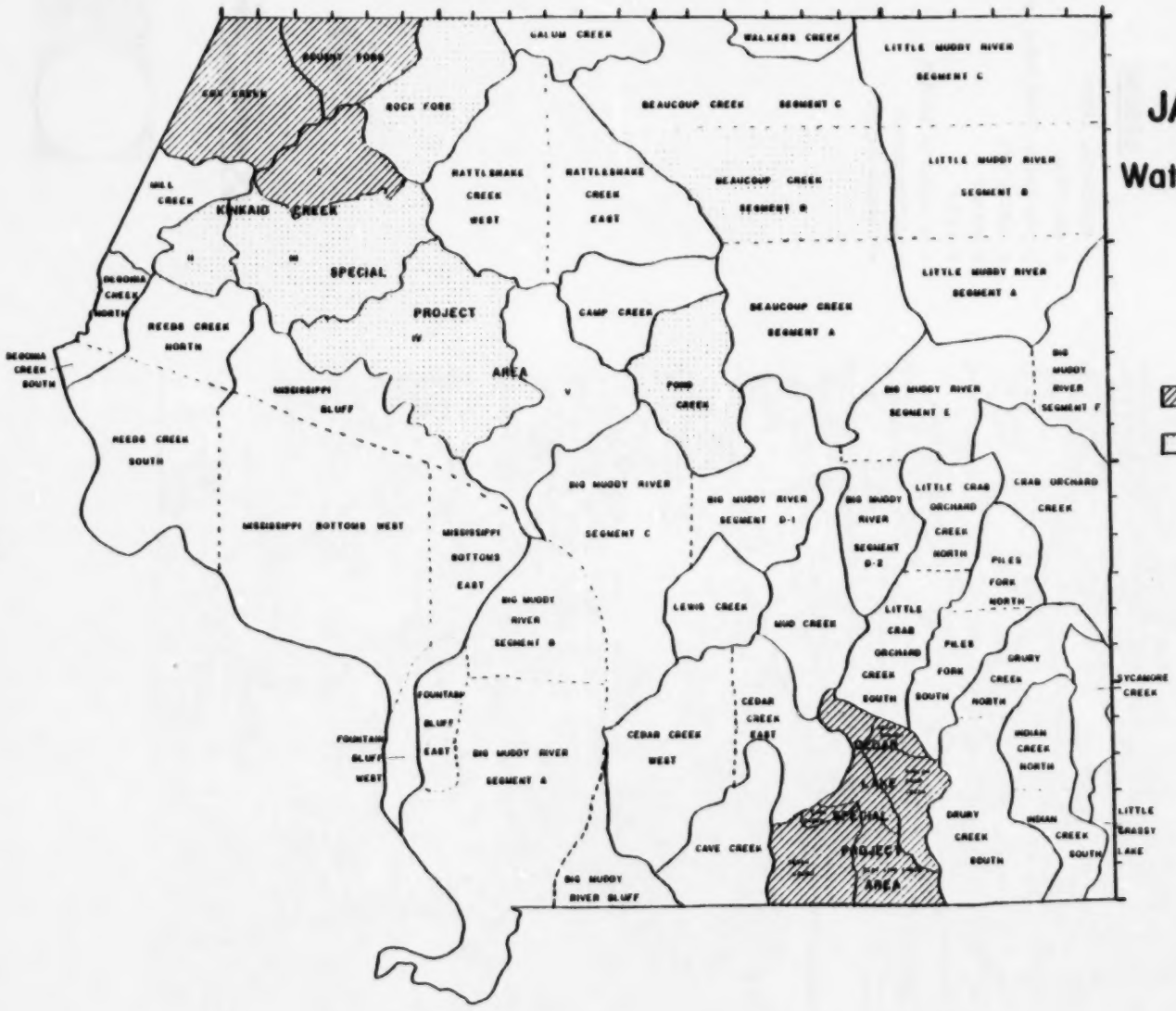

FIGURE 3

JACKSON COUNTY

Watersheds and Watershed Segments

LEGEND

- PRIORITY "1" FOR EROSION CONTROL
- PRIORITY "2" FOR EROSION CONTROL
- – SECTION DIVISION
- – TOWNSHIP DIVISION

N

scale in miles

1 0 1 2 3 4

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Figure 4
FIELD CHECK FORM

Date _____ Investigator(s) _____

_____

Location _____ Soil Type _____

Controls in Place _____

Local Slope Estimate _____% Gullying _____

Subsoil Exposure _____% Land Use _____

Location _____ Soil Type _____

Controls in Place _____

Local Slope Estimate _____% Gullying _____

Subsoil Exposure _____% Land Use _____

Location _____ Soil Type _____

Controls in Place _____

Local Slope Estimate _____% Gullying _____

Subsoil Exposure _____% Land Use _____

Location _____ Soil Type _____

Controls in Place _____

Local Slope Estimate _____% Gullying _____

Subsoil Exposure _____% Land Use _____

R-Factor: A standard R factor of 220 was chosen for use in soil loss determination. This factor is given as the standard for Jackson and surrounding counties in a handbook of soil loss determination distributed by the Cooperative Extension Service and authored by two University of Illinois soil specialists.[4]

K-Factor: The same handbook was used to obtain erodability factors (K-factor) for each soil type included in the soil associations of the county. A composite K factor was derived for each soil association from the various K factors given according to the percentage of each soil within the association as published in the Soil Survey of Jackson County.[5] Minor soils were given as a single percentage unit. Because of this the soils included as part of the minor soils group were treated as equal components of the group. The calculations used to arrive at the composite K factors are given in Appendix B. A composite K factor was then calculated for each watershed or watershed segment by placing a 40 acre scale grid over the soil associations overlay while it was superimposed on the watershed segments overlay and totalling the acreage of each soil association within each watershed segment. The respective soil association K factors were then multiplied by the percentage of the total segment acreage occupied by each soil association. The sum of these multiplication results divided by the sum of the percentages gave the composite K factor for the watershed segment.

LS Factor: Topographic factors (LS factors) were derived from a table provided by USDA-SCS from a technical guide.[6] Slope length and percent slope figures applied to the table were averages of figures gathered from one to seven sections in each watershed segment. The sections were selected as representative of slope conditions in the segment. Slope lengths were derived within each of the selected sections, in most areas from six sets of measurements made between contour lines on a USGS prepared 800' to the inch scale topographic map. Measurements were made with a small ruler graduated in 1/32nd inch increments. Measurements were made where contour lines were not sharply curved so that the measured slope length would not be simply one portion of a directionally complex slope. Slope length in these measurements would be defined as the distance over a ten foot change in relief. The six slope length measurements consisted of the longest and shortest in the section and one visually selected average measurement for each quarter section (cliffs and steep banks were not measured). The six slope lengths were averaged to obtain a section average. The percent slope average was calculated for each section by dividing 10 by the slope length average and multiplying by 100. These figures were then applied to the LS table. In some sections relief was too small to use this system. In those instances 5 foot intervals were measured or measurements were made between contour lines and bench marks. In both of these instances percent slope was obtained by dividing the difference in relief by the distance between points and multiplying by 100.

P-Factor: It was decided in discussions with the District Conservationist that a factor for cropping practice (P Factor) of 1.0 should be used in soil loss estimate calculations. The percentage of the total cultivated acreage in the county that is cropped on the contour was not considered sufficient to lower this factor.

C-Factor: Crop management or cover factors were assigned to each of the four major land uses as follows:

1. Row croplands - .31 based on a corn, soybeans, grain/ catch crop rotation after spring plowing with conventional tillage.
2. Other agricultural lands - .005 based on 75% grass with 95% cover and 25% ground cover consisting of 40% grass and 50% herbaceous cover. This combination was considered as representative of the pasture, hay, idle lands in the county.
3. Wooded lands - .004 based on 84.9% moderate second growth with floor litter, 15% lightly grazed or moderately cut wood lots and .1% severely grazed, eroded wooded areas.[7]
4. Residential/Commercial lands - .003 using the 95% grass cover factor.

Water areas were given no C factor; strip mined areas were given a C factor of .45 or .70 according to the observed ground cover condition.

A composite C factor was calculated for each watershed or watershed segment from land use percentages derived from the map illustrated in Figure 2 and from a LANDSAT land use cover map of Jackson County. The respective C factors were then multiplied by the percent of the total acreage devoted to each land use and the sum divided by the percent total for land uses used in the calculation.

Estimated Soil Loss: An estimate of the average soil loss for each watershed or watershed segment was calculated using the rainfall factor R = 220, the composite R factor for the respective watershed segment, the LS factor derived from the LS factor chart using the segment average slope length and percent slope, and the composite C factor calculated for the respective watershed segment. The calculation used was RK x LS x C = Estimated Average Soil Loss.

Priority Ranking

Watershed segments were ranked according to their need for erosion control management practices by a committee representing the Jackson County Soil and Water Conservation District and Greater Egypt Regional Planning and Development Commission. Committee choices were then discussed and a final decision made by the District Board. This prioritization process involved comparison of the USLE results for the various watershed segments and comparing concentrations of D-3 and E-3 highly eroded areas as found on soil survey maps. The relative level of row crop farming in the watershed segment was also considered as was the proximity of high soil loss areas to major streams.

Management practices best suited to erosion control needs in the priority areas were chosen by soil and water conservation district representatives. The S&WCD board then discussed the alternatives chosen and their application to the priority areas at a regular monthly meeting.

Seeking Cooperation and Reporting Progress

More than two hundred letters were sent to cooperators owning and operating farm lands in areas of Jackson County defined by the priority watershed segment boundaries. These letters invited them to attend one of three meetings held in or near the areas identified as having high priority for application of erosion control practices. Each cooperator was asked to invite neighbors so that farm operators not in S&WCD files would also receive invitations. In addition, two daily newspapers and four radio stations with Jackson County coverage were sent news releases announcing the meetings.

At each meeting the objectives and findings of the demonstration county project were explained. These were related to water quality and soil conservation needs in talks by the project coordinator and representatives of the Soil and Water Conservation District.

The goals of related state and federal acts, rules and regulations were explained. S&WCD board responsibilities pursuant to state regulations concerning the establishment of county guidelines and performance standards were mentioned in the presentation.

The services of U.S. Soil Conservation Service to cooperators and possibilities for cost sharing were described and the types of management practices best suited to the priority watersheds mentioned.

The county base map and overlays prepared for the project were displayed at each meeting and used in explanation of the project procedure and results.

Attendees were invited to ask questions and comment on the selected priority areas, the need for wider employment of conservation practices and the legislation and services that were explained. Owner operators that were not currently cooperators were invited to contact the S&WCD at the county offices and arrange for the preparation of a conservation plan for their property(s). The activities involved in preparation of a conservation plan were described.

The voluntary nature of the programs was emphasized; but, the establishment of mandatory programs in the future was described as a possible result of poor progress toward erosion control goals. Each person in attendance was asked to sign an attendance list giving mailing address and cooperator/non-cooperator status.

Possible follow-up activities were discussed by S&WCD board members previous to and after the meetings.

Methods of reporting progress were discussed at a regular meeting of the S&WCD board. The S&WCD board reviewed examples of report forms and indicated needs. A committee of S&WCD representatives and the project coordinator prepared the final version of the form for District Board approval.

Chapter 3

RESULTS AND DISCUSSION

Watersheds, Soils and Land Cover

The process of outlining watersheds on the 15 minute USGS map mosaic of Jackson County yielded thirty distinct watersheds. When the main stem of the Big Muddy River, the Mississippi River bottom lands and the larger tributary watersheds were divided into segments, a total of 54 watershed subunits resulted. Subunit size ranged from 2,030 acres to 21,686 acres with peripheral headwaters subunits (flowing out of the county) as small as 610 acres. The larger subunits occurred where topography was most uniform.

Lands owned by soil conservation cooperators in Jackson County total 148,644 acres or 38% of the county. Another 11.3% of the county is under public ownership. This includes 43,104 acres under the U.S. Forest Service and 6,674 acres owned and/or managed by the Kinkaid-Reeds Creek Conservancy District. Of the acreage owned by S&WCD cooperators 106,665 acres are currently under conservation plans.

Nine soil associations are found in the county. These are made up of 18 major soil types. Composite K and T factors found for these associations were found to be as follows:

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Soil Association	Composite K Factor	Composite T Factor
1. Belknap - Wakeland	.40	4.1
2. Darwin, Medway, Cairo	.29	3.8
3. Jacob, Booker	.30	3.6
4. Hurst, Colp, St. Charles	.41	3.3
5. Alvin, Camden	.30	4.4
6. Bluford, Ava, Wynose	.42	3.1
7. Hosmer	.40	3.7
8. Hosmer, Wellston	.39	3.6
9. Alford, Wellston	.36	4.2

Land cover in the county was found to be highly variable. This was demonstrated by the ranges of land use percentage in the land use categories used to develop composite C factors for the various segments. Ranges and averages for these were as follows:

Land Use	Range of Percent	Countywide Mean Percentage
Cropland	81.2 - 4.2	38.4%
Grass/Hay/Idle	43.6 - 3.6	14.7%
Woodland	89.0 - 7.4	38.5%
Residential/Commercial	41.8 - 0	6.0%

NOTE: See Appendix C for all land use data used in determination of C factors.

The variable topography of the county is reflected in the ranges of land cover and in the range of topographic factor (LS factor). LS factor ranged from 3.60 in the Cedar Lake watershed to 0.19 in the Mississippi River bottoms. See Appendix C for the LS factors of all segments.

The Soil Survey of Jackson County identifies areas of severe erosion. When these were color coded to mark severely eroded areas of 12-18% and 18-30% slope on a composite map of the entire county the result was a visually discernable pattern of concentration in the north, west, and southeast portions of the county. Field checks of severely eroded lands on slopes of 6-12%, 12-18% and 18-30% slopes revealed a universal incidence of subsoil exposure and gullying on the 12-30% slope areas. As a result, concentrations of these areas were considered along with soil loss estimates in the choice of priority areas for concentration of treatment.

Current Erosion Status

Thirty of the fifty-four watershed segments yielded soil loss estimates over tolerance levels (Table 1). Of these thirty, two averaged an estimated soil loss which exceeded three times T and four averaged an estimated soil loss which exceeded double T. On a countywide basis approximately 6,020 acres (1.6 percent of the county) averaged more than 3T estimated soil loss, and approximately 22,740 acres (5.9 percent of the county) averaged more than 2T estimated soil loss.

Estimated soil loss figures ranged from 12.8 average tons per acre per year for Kinkaid Creek Segment I to 1.4 average tons per acre per year for the Big Muddy River Segment A. This is a range from 9 tons/acre/year over tolerance to 2.4 tons/acre/year below tolerance levels. The county mean soil loss estimate reached 4.8 tons/acre/year which is 1.0 tons/acre/year over the county average tolerance factor of 3.8 tons/acre/year. Soil loss estimates for all 54 watershed subunits are given in Appendix C.

It should be remembered in regard to these results that an average soil loss estimate figure for an area measuring in the thousands of acres may mask a wide range of localized conditions. This can be illustrated by comparing tons/acre/year estimated soil loss obtained when the USLE is worked using slope measurements from selected high and low topography sections within a segment and the highest and lowest slope measurements in the segment:

	Average Soil Loss	Range of Section Averages	Segment Range of Soil Loss
Cox Creek	11.0	7.1 - 19.9	4.3 - 133.0
Beaucoup Creek	5.2	4.8 - 5.8	4.8 - 160.7

Basic data for development of universal soil loss factors were forwarded to W. E. Gates and Associates for use in their Areal Design and Planning Tool analysis procedure. Information outputs from this source will be added to results from this study to help the Jackson County Soil and Water Conservation District Board in their final prioritization of target areas and determination of county standards.

Priority Watersheds

The soil and water conservation district used high estimated soil loss, concentration of severely eroded areas and potential for sedimentation of reservoirs and major streams as criteria for prioritization. Table 1 shows estimated soil loss levels of the watershed segments with estimated soil losses above tolerance level. The Kinkaid and Cedar Lake watersheds, the northwest watersheds and the mid-Beaucoup area were regarded as high priority areas for concentration of soil conservation efforts. Because Cedar Lake, Kinkaid Creek Segment I, Brushy Fork, and Cox Creek gave some of the highest soil loss estimates, and also had concentrations of severely eroded areas, these watersheds were assigned first priority for conservation efforts. Segment B of the Beaucoup Creek watershed, Segments II, III and IV of the Kinkaid watershed, and Pond Creek watershed were assigned second priority because of their high soil loss estimates, the high percentage of row crop acreage and the proximity of crop lands to a major stream system or supply reservoir.

The Kinkaid Creek and upper Cedar Creek watersheds had previously been assigned first priority for erosion control because of their contribution of runoff to the major water supply reservoirs of the county and the western portion of the ten county 208 area. The high estimated soil loss figures arrived at for four of the Kinkaid segments and for the Jackson County portion of the Cedar Lake watershed served to underscore the importance of the decision (during the initial 208 planning process) to consider these watersheds critical erosion areas. The selection of the Kinkaid watershed by the Jackson County Soil and Water Conservation District as a special project area in 1979 was also supported by these results.

Some soil loss estimates reflect special situations. An example of this is to be found in the low estimate calculated for the Fountain Bluff East subunit, where the lack of crop land areas and high percentage of forest cover resulted in a suspiciously low estimate in spite of steep slopes. Another example occurred in the case of the Sycamore Creek watershed where an abandoned coal mine actively erodes directly into the stream. Even though the mine constitutes only 3.2% of the Sycamore Creek watershed area, calculation of estimated soil loss without consideration of the mine results in a drop from 6.0 tons/acre/year to 4.9 tons/acre/year. Based on these data a thorough reclamation of the abandoned mine alone could bring the watershed average soil loss within one ton per acre per year of tolerance level.

Table 1
WATERSHED SEGMENTS HAVING AN ESTIMATED
SOIL LOSS GREATER THAN TOLERANCE LEVEL

Watershed Designation	T Value	Estimated Soil Loss	Soil Loss Over T	Soil Loss Over 2T
Kinkaid Creek I	3.8	12.8	9.0	5.2
Brushy Fork	3.7	11.7	8.0	4.3
Cox Creek	3.7	11.0	7.3	3.6
Cedar Lake VI	4.0	11.1	7.1	3.1
Rattlesnake Creek W	3.7	7.3	3.6	
Drury Creek	3.7	7.2	3.5	
Indian Creek N	3.8	7.0	3.2	
Pond Creek	3.7	6.3	2.6	
Kinkaid Creek IV	4.1	6.4	2.3	
Rock Fork	3.6	5.9	2.3	
Kinkaid Creek III	4.1	6.3	2.2	
Sycamore Creek	3.8	6.0	2.2	
Big Muddy River C	4.2	6.3	2.1	
Beaucoup Creek B	3.4	5.2	1.8	
Kinkaid Creek II	4.1	5.8	1.7	
Little Muddy River A	3.3	5.0	1.7	
Cedar Creek E	4.2	5.9	1.7	
Beaucoup Creek C	3.4	5.0	1.6	
Mill Creek	3.8	5.0	1.2	
Indian Creek S	3.7	4.9	1.2	
Walker's Creek	4.2	5.3	1.1	
Camp Creek	3.7	4.6	0.9	
Mississippi Bottoms W	3.8	4.6	0.8	
Rattlesnake Creek E	3.7	4.5	0.8	
Crab Orchard Creek	3.8	4.3	0.5	
Big Muddy River F	3.8	4.3	0.5	
Little Grassy Lake	3.6	4.1	0.5	
Big Muddy River D-2	3.6	4.0	0.4	
Beaucoup Creek A	3.6	3.7	0.1	
Big Muddy River Bluff	4.2	4.3	0.1	

Source: Greater Egypt Regional Planning and Development Commission staff.

Best Management Practices

Best management practices most commonly used in Jackson County include conversion to permanent land cover, various types of conservation tillage, inclusion of more frequent cover crops in crop rotation, contour tillage, contour strip cropping and terraces. For the northwest area of the county where most of the watershed subunits are headwaters, the most recommended practices would be no till or other conservation tillage, conversion to more permanent cover, and contour farming. No till and other conservation tillage methods were regarded as a prime choice for all of the priority areas because of their cost effectiveness and applicability to a variety of slope conditions.

In the Cedar Lake watershed, conservation tillage, conversion to permanent cover and contour strip cropping with permanent meadow or hay crops in odd shaped plots were the conservation practices regarded as most useful.[8]

No till or conservation tillage and crop rotations without successive years of soybeans or corn are the primary recommended practices for the Beaucoup and Pond Creek watersheds. The longer slopes in these watersheds may make terraces practical where slopes are uniform and exceed 2 to 3%, but uniform slopes are not common. A special problem is the practice of tilling up to creek banks. Development and maintenance of buffer zones of trees, bushes and grass would help reduce the impact of soil movement on streams in these watersheds.

As part of the procedure of preparing conservation plans the district conservationist and technicians offer as many alternative solutions to erosion problems as possible for each given acreage. It is felt that providing an element of choice for the landowner will help assure that conservation practices and the conservation plan in general will be carried out and maintained over time. For this reason it has become the policy of the Jackson County Soil and Water Conservation District's technical arm to provide a choice for farm owner/operators between a variety of alternatives that will be likely to lead to achievement of the tolerance level of erosion or less.

Meetings were held for owners and operators of farms at Vergennes in the Beaucoup Creek watershed, at Campbell Hill in the Cox Creek watershed, and at the Jackson County Extension Center near Murphysboro, which is centrally located and not far from the Pond Creek, Cedar Lake and lower

Kinkaid Lake areas. The project coordinator, the district conservationist and an officer of the Soil and Water Conservation District Board made presentations at each meeting. At the Extension Center meeting a representative of the Agricultural Stabilization and Conservation Service and the County Extension Agent were also present to answer questions.

The meetings drew a total of twenty-four owners who operate farms within the priority watershed segments. Of these, six were not cooperators and eighteen were cooperators. Much interest was expressed and numerous questions asked at the meetings. The questions generally fit four categories: 1) questions to clarify the data and information given regarding erosion potential and soil loss in the various watersheds; 2) questions about the implications of the clean water act and state erosion and sediment control guidelines alluded to in the presentations; 3) questions about practical aspects of specific conservation practices; and 4) questions about financial assistance programs for carrying out conservation practices.

Of the twenty-four owner/operators present at the meetings, five cooperators and two non-cooperators answered "yes" to the question "Do you want the S&WCD to contact you?", which appeared on the registration sheet.

Public information about the meetings was provided through the local newspapers. A follow-up article on the total project is planned for the Greater Egypt Regional Planning and Development Commission Newsletter. Findings of the project are to be presented in a general news release and in a public information meeting.

It was felt that the meetings were a useful vehicle for garnering wider support for soil conservation and water quality concepts in priority areas in spite of the low level of attendance. Because of an unusually dry season corn harvest was just beginning the week of the meetings. Future meetings could be held at a better time. The cooperation involving agencies and the district board created a positive atmosphere in the meetings. The realization that active solicitation of cooperators in specific critical areas of the county can have positive results was of special benefit to all.

Possible follow-ups for the owner/operator meetings were considered by the Soil and Water Conservation District. These included contacts with

cooperators and non-cooperators who indicated an interest in being contacted on the registration sheet for the purpose of discussing planning of best management practices designed to meet the needs of their individual farm operations. A future set of similar meetings will also be considered by the S&WCD. These would be held in a better season, such as in February or March.

The results of this demonstration project will be considered along with the results of the Kinkaid Lake and Cedar Lake special projects as the Jackson County Soil and Water Conservation District continues its work toward development of county guidelines and performance standards in keeping with the directives of the state sediment and erosion control guidelines. Standards have been considered by the county advisory committee. A form for progress reporting was developed by the Soil and Water Conservation District. The initial version of this form appears as Appendix D. The report was designed to coordinate with information gathering and reporting required by state and county guidelines in both frequency and information needs. The report is intended to be updated quarterly.

In addition, the report information may become part of annual reporting to the Soil and Water Conservation District cooperators and to the Regional Water Quality Coordinating Council, if that group should require updates on sediment and erosion control progress as a means of assessing the potential danger to water quality posed by soil loss.

REFERENCES

[1]United States Department of Agriculture, Soil Conservation Service and Forest Service in cooperation with Illinois Agricultural Experiment Station. Soil Survey of Jackson County, Illinois, February, 1979.

[2]Illinois Department of Agriculture, State Erosion and Sediment Control Guidelines as Adopted April 18, 1980.

[3]Illinois Revised Statutes, Chapter 5, Paragraph 106 et. seq., Soil and Water Conservation District Act.

[4]Walker, Robert D. and Robert A. Pope, Estimating Your Soil Erosion Losses with the Universal Soil Loss Equation (USLE), Cooperative Extension Service, College of Agriculture, University of Illinois at Urbana-Champaign, September, 1979.

[5]IBID #1

[6]Tables from U.S. Department of Agriculture - Soil Conservation Service Land Use and Management Systems Technical Guide Section III-1.

[7]Bacon, D.D., Forest Land Erosion and Sediment Evaluation Handbook, U.S. Forest Service Handbook, NA August, 1972, Exhibit 5 Table "Relative Rates of Erosion Under Various Forest Conditions".

[8]Greater Egypt Regional Planning and Development Commission, Water Quality Investigations in Cedar Lake, Areawide Waste Treatment and Water Quality Management Plan for Southern Illinois, Appendix B-4 Part I, November, 1978.

[9]IBID #4

APPENDIX A

UNIVERSAL SOIL LOSS EQUATION

The Universal Soil Loss Equation is a primary tool in estimating erosion of specific land areas. The equation takes into account the major factors determining the soil loss that will occur as a result of erosion. The basis equation can be expressed as:

$$A = R\ K\ L\ S\ C\ P$$

where:

A is the computed soil loss per year per unit area of land expressed in tons per acre.

R is the average annual rainfall erosion index or the average annual force of rainfall.

K is the soil erodibility factor. It is a measure of the rate at which a soil will erode expressed as tons per acre per year per unit of R for a 9 percent slope 72.6 feet long under continuous cultivated farrow. (Soil loss tolerance (T) is not found in the equation, but is important to the use of the equation in practical field application. It is the maximum soil loss in tons per acre per year which can be tolerated on a specific soil and still permit a high level of crop production to be sustained economically and indefinitely.)

L is the slope length factor. It is the ratio of soil loss from a specified slope length to that from a slope length of 72.6 feet long, which is the slope length for the K value in the equation. A slope length of 72.6 feet long has a factor value of 1.L as determined in the field.

S is the slope gradient factor. It is the ratio of soil loss from a specific slope gradient to that from a gradient of 9 percent, which is the slope gradient specified for the K value in the soil loss equation. A slope gradient of 9 percent has a factor value of 1.S as determined in the field. L and S are usually handled in combination. The soil loss ratio--SL, can be read directly from the slope-effect chart.

C is the cropping management factor. It is the ratio of soil loss from land cropped under specified conditions to the corresponding loss from the land in continuous fallow. Continuous fallow has a factor value of 1 in the equation.

P is the conservation practice factor. It is the ratio of soil loss from a specified conservation practice to soil loss from up-and-down hill tillage operations. Up-and-down hill tillage has a factor value of 1 in the equation.

Source: Greater Egypt Regional Planning and Development Commission, November, 1978, Areawide Waste Treatment and Water Quality Management Plan for Southern Illinois, Appendix B-2, Pollution Sources: Agriculture.

APPENDIX B

THE DERIVATION OF COMPOSITE K FACTORS FOR JACKSON COUNTY SOIL ASSOCIATIONS

Composite K and T factors were derived from factors given in the handbook from the Cooperative Extension Service.[9] The single composite value for each association was calculated from the relative percentage of each soil type found in the association. Since percentages were not available for the minor soil types they were treated as equal parts of the percentage given to the minor soils collectively. The following table gives the soils data used to derive K and T values.

1. Belknap-Wakeland Association, Composite K = .40 Composite T = 4.1

Belknap 26%	K = .37	T = 5.0
Wakeland 25%	K = .37	T = 5.0

Minor Soils 49% Average K = .43 Average T = 3.1

Okaw	K = .43, T = 2.5	Bonnie	K = .43, T = 5.0
Banlic	K = .43, T = 4.0	Piopolis	K = .43, T = 4.0

2. Darwin-Medway-Cairo Association, Composite K = .29, Composite T = 3.8

Darwin 34%	K = .28	T = 3.0
Medway 17%	K = .32	T = 5.0
Cairo 15%	K = .28	T = 4.0

Minor Soils 34% Average K = .31 Average T = 4.0

Ware	K = .32, T = 4.0	Karnak	K = .32, T = 3.0
Gorham	K = .32, T = 5.0	Bowdre	K = .28, T = 4.0

3. Jacob-Booker Association, Composite K = .30, Composite T = 3.6

Jacob 54%	K = .28	T = 3.0
Booker 29%	K = .37	T = 5.0

Minor Soils 17% Average K = .27 Average T = 3.3

Darwin	K = .28, T = 3.0	Karnak	K = .32, T = 3.0
Cairo	K = .28, T = 4.0		

4. Hurst-Colp-St. Charles Association, Composite K = .41, Composite T = 3.3

Hurst 28%	K = .43	T = 2.5
Colp 26%	K = .43	T = 2.5
St. Charles 14%	K = .37	T = 4.5

Minor Soils 32% Average K = .39 Average T = 4.2

Okaw	K = .43, T = 2.5	Camden	K = .37, T = 4.5
Starks	K = .37, T = 5.0	Sexton	K = .43, T = 4.0
Wakeland	K = .37, T = 5.0		

5. Alvin-Camden Association, Composite K = .30, Composite T = 4.4

Alvin 54%	K = .24	T = 4.5
Camden 27%	K = .37	T = 4.5

Minor Soils 19% Average K = .39 Average T = 4.0

Starks	K = .37, T = 5.0	St. Charles	K = .37, T = 4.5
Colp	K = .43, T = 2.5		

6. Bluford-Ava-Wynose Association, Composite K = .42, Composite T =3.1

Bluford 34%	K = .43	T = 2.5
Ava 19%	K = .43	T = 3.5
Wynose 17%	K = .43	T = 3.0

Minor Soils 30% Average K = .39 Average T = 3.7

Hickory	K = .37, T = 4.5	Hoyleton	K = .37, T = 2.5
Racoon	K = .43, T = 3.0	Belknap	K = .37, T = 5.0

7. Hosmer Association, Composite K = .40, Composite T = 3.7

Hosmer 54%	K = .43	T = 3.5

Minor Soils 46% Average K = .36 Average T = 3.9

Hickory	K = .37, T = 4.5	Neotoma	K = .20, T = 2.5
Stoy	K = .43, T = 3.5	Wellston	K = .37, T = 3.5
Alford	K = .37, T = 4.5	Wakeland	K = .37, T = 5.0
Banlic	K = .43, T = 4.0		

8. Hosmer-Wellston Association, Composite K = .39, Composite T = 3.6

Hosmer 56%	K = .43	T = 3.5
Wellston 19%	K = .37	T = 3.5

Minor Soils 25% Average K = .32 Average T = 4.0

Alford	K = .37, T = 4.5	Neotoma	K = .20, T = 2.5
Belknap	K = .39, T = 5.0		

9. Alford-Wellston Association, Composite K = .36, Composite T = 4.2

Alford 60%	K = .37	T = 4.5
Wellston 14%	K = .37	T = 3.5

Minor Soils 26% Average K = .33 Average T = 3.9

Neotoma	K = .20, T = 2.5	Hickory	K = .37, T = 4.5
Hosmer	K = .43, T = 3.5	Burnside	K = .37, T = 4.0

Source: Greater Egypt Regional Planning and Development Commission staff.

APPENDIX C

LAND USE AND USLE DATA FOR ALL SEGMENTS
(In Descending Order of Soil Loss Over T)

Watershed Designation	Estimated Land Use Percentage				Averages of USLE Factors				Est. Soil Loss
	Crop	G/H/I	Wood	R/C	K	LS	C	T	Tons/Acre/Year
Kinkaid Creek I	46.2	15.4	37.8	0.5	.39	1.00	.15	3.8	12.8
Brushy Fork	56.3	19.2	20.6	2.7	.40	.74	.18	3.7	11.7
Cox Creek	60.2	20.1	16.6	3.1	.40	.66	.19	3.7	11.0
Cedar Creek*	10.8	24.0	63.1	2.1	.37	3.60	.04	4.0	11.1
Rattlesnake Creek W	42.4	14.2	42.6	0.6	.40	.64	.13	3.7	7.3
Drury Creek S	19.6	6.6	55.6	18.2	.39	1.40	.06	3.7	7.2
Indian Creek N	23.6	15.7	58.1	2.6	.40	1.00	.08	3.8	7.0
Pond Creek	63.5	21.2	10.0	4.5	.39	.37	.20	3.7	6.3
Kinkaid Creek IV	32.3	10.8	41.0	0.1	.37	.66	.12	4.1	6.4
Rocky Fork	51.9	17.3	20.5	10.3	.40	.42	.16	3.6	5.9
Kinkaid Creek III	28.4	9.5	54.9	3.8	.37	.86	.09	4.1	6.3
Sycamore Creek	27.9	9.3	52.5	6.1	.40	.62	.11	3.8	6.0
Big Muddy River C	38.1	16.3	57.7	0.4	.38	.63	.12	4.2	6.3
Beaucoup Creek B	55.2	17.8	16.0	0.4	.41	.26	.22	3.4	5.2
Kinkaid Creek II	50.7	16.9	30.0	0	.35	.44	.17	4.1	5.8
Little Muddy River A	26.2	9.2	36.9	0.6	.41	.29	.19	3.3	5.0
Cedar Creek E	26.2	17.4	51.5	3.2	.45	.74	.08	4.2	5.9
Beaucoup Creek C	63.9	14.2	17.5	0.1	.41	.24	.23	3.4	5.0
Mill Creek	46.7	25.1	27.7	0.4	.39	.42	.14	3.8	5.0
Indian Creek S	12.2	8.1	52.6	27.1	.40	1.40	.04	3.7	4.9
Walker's Creek	69.4	23.1	7.4	0	.42	.26	.22	4.2	5.3
Camp Creek	65.5	21.8	12.7	0	.40	.26	.20	3.7	4.6
Mississippi Bottoms W	79.3	14.0	3.4	0.7	.40	.21	.25	3.8	4.6
Rattlesnake Creek E	53.0	17.7	27.8	0.4	.40	.30	.17	3.7	4.5
Crab Orchard Creek	53.2	17.7	23.8	1.6	.40	.29	.17	3.8	4.3
Big Muddy River F	51.2	17.1	29.1	0	.40	.29	.17	3.8	4.3

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APPENDIX C (cont.)

Watershed Designation	Estimated Land Use Percentage Crop	G/H/I	Wood	R/C	Averages of USLE Factors K	LS	C	T	Est. Soil Loss Tons/Acre/Year
Little Grassy Lake	13.2	19.7	57.0	1.3	.39	1.20	.04	3.6	4.1
Big Muddy River D-2	48.2	16.1	31.2	3.5	.40	.30	.15	3.6	4.0
Beaucoup Creek A	51.2	17.2	29.6	0.8	.39	.27	.16	3.6	3.7
Big Muddy River Bluff	14.2	4.9	80.6	0	.36	1.10	.05	4.2	4.3
Reeds Creek S	81.2	9.1	8.7	0.7	.37	.20	.25	4.2	4.1
Degonia Creek S	72.5	12.8	13.1	1.6	.40	.20	.23	4.1	4.0
Little Crab Orchard S	37.3	24.9	12.8	25.0	.40	.38	.12	4.0	4.0
Kinkaid Creek V	29.5	9.9	35.1	2.6	.38	.40	.12	4.0	4.0
Big Muddy River E	47.6	15.9	21.6	15.0	.39	.30	.15	3.9	3.9
Cedar Creek W	21.1	12.1	69.8	0	.37	.67	.07	4.2	3.8
Drury Creek N	45.2	15.1	31.1	8.6	.40	.30	.14	3.9	3.7
Galum Creek	51.0	17.0	32.0	0	.40	.24	.16	3.9	3.4
Little Crab Orchard Cr. N	35.6	43.6	15.9	4.9	.41	.33	.11	3.5	3.3
Mud Creek	50.7	16.9	28.3	4.1	.40	.37	.16	3.8	3.2
Big Muddy River D-1	26.3	8.7	21.3	43.2	.40	.46	.08	3.8	3.2
Mississippi Bottoms E	57.7	10.1	20.0	12.2	.40	.19	.18	3.7	3.0
Piles Fork S	16.0	24.0	16.6	39.2	.39	.58	.06	3.7	3.0
Little Muddy River C	27.6	9.2	57.7	0.4	.41	.34	.09	3.3	2.8
Degonia Creek N	12.4	4.2	82.7	0.7	.36	.88	.04	4.2	2.8
Fountain Bluff W	12.7	8.5	64.3	14.5	.39	.80	.04	4.0	2.7
Lewis Creek	25.9	8.6	65.0	0.5	.36	.43	.08	4.2	2.7
Little Muddy River B	34.6	11.5	53.9	0	.41	.27	.11	3.4	2.7
Big Muddy River B	39.8	6.1	53.9	0	.39	.22	.13	3.6	2.4
Reeds Creek N	10.8	3.6	79.6	6.0	.30	.88	.04	3.8	2.3
Cave Creek	19.3	8.9	77.4	2.2	.37	.43	.06	4.2	2.1
Piles Fork N	24.9	24.9	8.5	41.8	.40	.27	.08	3.8	1.9
Fountain Bluff E	4.2	6.3	89.0	0.4	.37	1.10	.02	4.1	1.8
Big Muddy River A	25.1	4.4	67.1	0.1	.40	.20	.08	3.8	1.4
Range	81.2/4.2	43.6/3.6	89/7.4	41.8/0				4.2/3.3	12.8/1.4
Mean	38.4	14.7	38.5	6.0				3.8	4.8

*Cedar Lake figures are averages derived from data accumulated by tributary watersheds for a report on Rend and Cedar Lakes published January, 1980.
Source: Greater Egypt Regional Planning and Development Commission staff.

APPENDIX D

208 QUARTERLY PROGRESS REPORTING FORM

Management Agency: _____

Reporting Period: _____ To: _____

1. Number of operating units in district: _____
2. Number of cooperators in district: _____
3. Number of new cooperators this period: _____
4. Number of service contacts this period: _____
5. Number of group meetings held: _____

6. Number of acres benefited by application of conservation measures: _____
7. Number of acres adequately protected: _____
8. Number of acres adequately treated: _____
9. Number of acres needing treatment: _____
10. Number of acres under a conservation plan: _____
11. Number of conservation plans cancelled: _____
12. Number of acres on which conservation practices have been abandoned: _____
13. Number of contacts made in high priority areas: _____
14. Number of acres treated in high priority areas: _____
15. Cooperator acreage meeting 1988 goals : _____
    1994 goals : _____
    2000 goals : _____
16. Estimated county acreage meeting 1988 goals: _____
    1994 goals: _____
    2000 goals: _____

17. Number of municipalities in county: _____
18. Number of municipal officials contacted: _____
19. Number of 22.02a and natural resource inventories prepared: _____
20. Tours conducted: _____
21. Number of news releases: _____